Resource acquisition and co-production in entrepreneurial ecosystems

RESOURCE ACQUISITION AND CO-PRODUCTION IN ENTREPRENEURIAL ECOSYSTEMS

Presented at the 2016 Babson Entrepreneurship Research Conference, Bodø Norway

Ben Spigel
University of Edinburgh Business School
Edinburgh, Scotland

ABSTRACT

Entrepreneurial ecosystems have emerged as a key topic of research and debate amongst both researchers as well as policymakers and entrepreneurs themselves. Current research on entrepreneurial ecosystems have focused primarily on identifying the core attributes or factors associated with strong ecosystems and in developing new methods to identify the strengths and weaknesses of various ecosystems. Less has been done on how entrepreneurs engage with and draw resources from their ecosystem. This paper reports results from a pilot study with 8 high-growth entrepreneurs in Edinburgh, Scotland. Interviews suggest that knowledge about the entrepreneurship process itself is a crucial resource in ecosystems and that the types of resources entrepreneurs gather from their ecosystem changes as the firms grow and based on the entrepreneurs' backgrounds. This suggests that entrepreneurial ecosystems are dynamic and heterogeneous and that entrepreneurs engage with them differently based on their unique needs.

Introduction

The study of entrepreneurial ecosystems has seen a significant growth in interest over the past several years, with numerous scholars and policymakers approaching the topic from a variety of different perspectives (Acs, Autio, & Szerb, 2014; Audretsch & Belitski, 2016; Auerswald, 2015; Autio, Kenney, Mustar, Siegel, & Wright, 2014; Mack & Mayer, 2015; Motoyama, Konczal, Bell-Masterson, & Morelix, 2014; Spigel, 2015c; Stam, 2015). Building on prior work on entrepreneurial environments and the geography of entrepreneurship (e.g. Dubini, 1989; Malecki, 1997; Moore, 1993; Neck, Meyer, Cohen, & Corbett, 2004; Peer, 1994; Spilling, 1996; Van de Ven, 1993; Zacharakis, Shepherd, & Coombs, 2003), ecosystems represent a new direction for entrepreneurship research that simultaneously increases our knowledge of the complex contextual environment surrounding the entrepreneurship process while at the same time providing useful contributions to policy debates around the role of high-growth entrepreneurship as a driver of regional economic development. However, as Stam (2015) argues, current ecosystem research has been driven by a strong policy interest rather than based on a strong research foundation. As a result, while there has been substantial attention paid to identifying the particular attributes or factors associated with strong entrepreneurial ecosystems (e.g. C. M. Mason & Brown, 2014; Spigel, 2015c; Stam, 2015; Startup Genome Project, 2012; World Economic Forum, 2013), less is known about how entrepreneurs actually engage with their ecosystem and how they draw on the resources, ideas, and networks held within them. Ecosystem research has focused on a macro-perspective of identifying ecosystems and their primary attributes rather than on the micro-perspectives on how entrepreneurs interact with and gain resources from their ecosystem. This makes it difficult to empirically verify the role of ecosystems and what benefits, if any, entrepreneurs gain from their engagement with it.

The purpose of this article is to critically examine how entrepreneurs engage with their local ecosystem. Ecosystem engagement involves understanding how entrepreneurs interact with other entrepreneurial actors and organisations designed to support venture creation and growth in their home region as well as how they access the financial, knowledge, human capital, and other types of resources there. Drawing on a set of 8 pilot interviews with high-growth entrepreneurs in Edinburgh, Scotland, the paper argues that there are substantial differences in how entrepreneurs engage with their ecosystem based on factors such as their background, their industry, and their stage of development. This suggests that a regional entrepreneurial ecosystem is not a monolithic entity but a dynamic system of relationships and resources which entrepreneurs strategically engage with. As a result, more nuanced understandings of ecosystems are needed that go beyond defining the attributes of a successful ecosystem and instead explore the micro-level interactions that entrepreneurs have within their ecosystem.

Literature Review

Entrepreneurial ecosystems represent a particular arrangement of regional economic, social, cultural, political and economic factors that are conducive to formation, survival and growth of innovative new ventures, typically in advanced, knowledge-based sectors. Though the term 'entrepreneurial ecosystem' dates back more than two decades (Dubini, 1989), its more recent popularity is due to work in the popular business sphere by Dan Isenberg (2010) and Brad Feld (2012), which examined the creation of successful entrepreneurial regions like Boulder, Colorado. Both these as well as subsequent work by Brown and Mason (2014) , Spigel (2015), and Stam

(2015) amongst others sought to identify several key attributes of entrepreneurial ecosystems. These include cultural attitudes within a region, histories of entrepreneurship, strong social networks, research universities, mentors and role models, highly skilled workers, early stage investment from angel investors and follow-up investment from venture capitalists, supportive government policies, and a strong local market have all been identified as key factors in creating and sustaining an entrepreneurial ecosystem (Spigel, 2015c; Stam, 2015; World Economic Forum, 2013). As shown in Table 1, there is general agreement amongst different researchers over the most important attributes underlying entrepreneurial ecosystems.

Drawing on earlier work on the entrepreneurial environments and the geography of entrepreneurship (Malecki, 1997; Peer, 1994; Spilling, 1996), the ecosystems literature as sought to explain the sustained ability of certain regions to produce high quality startups. While having many similarity to previous concepts such as clusters and industrial districts, entrepreneurial ecosystems represent a development on this previous literature in three ways. First is the focus on high-growth, high-quality startups (Stam, 2015). This is a shift from previous research which focused largely on the number of new startups created as a sign of a region's entrepreneurial potential rather than their quality or growth potential. Recent work has argued that only a small proportion of new startups account for the bulk of new job creation (C. Mason & Brown, 2013). These firms are centred around an opportunity that has the promise for quick market growth and are structured in such a way to allow them to secure outside investment and scale up. Policies focused on aggregate levels of venture creation overlook the fact that high-growth entrepreneurs need very different types of support, such as help getting access to venture capital and training on how to scale up a firm, than smaller scale entrepreneurs (Motoyama et al., 2014).

Second, ecosystem research has emphasised the interconnections between different elements within a region's entrepreneurial environment and economy (Spigel, 2015c). Ecosystems are more than regions with high rates of startup creation. Rather, they are defined by the relationships between various attributes which help to reproduce and transform the ecosystem over time, creating durable environments and cultural outlooks that catalyse high growth entrepreneurship. This means that research on ecosystems has to go beyond examining individual elements such as a region's support policies or its investment capacity, but instead seek to explore the larger environment that helps support and reproduce the individual elements over time.

Third, work on ecosystems has highlighted the importance of leadership coming from entrepreneurs themselves rather than top down control from the state or philanthropic organisations. As opposed to concepts such as clusters or regional innovation systems which rely on the state or large firms to create the necessary infrastructure and networks to propel economic growth, entrepreneurial ecosystems are inherently led by the entrepreneurs themselves who identify the issues that need to be addressed and create the organisations and institutions that drive the required change (Feld, 2012; Stam, 2015). Entrepreneurs are best positioned to identify the most pressing barriers to growth and being entrepreneurs they are already skilled at quickly building new organisations to address needs in the market place. The role of the public sector is to act as a facilitator and connector rather than as the prime mover in the creation and growth of an entrepreneurial ecosystem.

Hypothesis Development

In the limited empirical work available on entrepreneurial ecosystems, entrepreneurial ecosystems tend to be treated as homogeneous entities that confer equal benefits on entrepreneurs regardless of their industry, scale, background, or embeddedness in the region. This is true both of large scale quantitative research (Acs et al., 2014; Audretsch & Belitski, 2016) as well as the more qualitative and conceptual work (Spigel, 2015c). However, previous research in areas such as entrepreneurial networks, embeddedness, and absorptive capacity suggest that the background of entrepreneurs and the nature of their new ventures will have a profound influence on how they engage with their ecosystem and their ability to draw resources from it (Anderson, Dodd, & Jack, 2010; de Clercq & Voronov, 2009). As a result, we would *a priori* suspect that entrepreneurs engage with their ecosystem in different ways.

Drawing on the legacy of clusters and systems of innovation, many researchers have largely viewed the benefits of entrepreneurial ecosystems through the lens of agglomeration economies and knowledge spillovers from universities. By being co-located in a dense, urban area, entrepreneurs are able to learn about new technological developments from nearby research universities, access nearby angel investors and venture capitalists, gain access to pools of skilled workers, and observe changes in the marketplace (Henry & Pinch, 2000). From this, the most important resources of an entrepreneurial ecosystem is access to cutting edge technological developments. However, this ignores other resources that have been less well studied within the literature. Prime amongst these are access to a community of other entrepreneurs who provide support and knowledge about the entrepreneurship process itself (Spigel, 2015a). Knowledge about the entrepreneurship process — such as how to structure a business pitch, what investors to avoid, or how to deal with the challenges of quickly doubling your workforce — can transcend sectoral boundaries and does not depend on everyone in the entrepreneurial community having a common market or technological background (Aldrich & Yang, 2014). Beyond this, entrepreneurs benefit from being part of a

community of other entrepreneurs who can provide emotional support, inspire each other with their success, and help create a vibrant 'buzz' of new opportunities and sources of support.

P1: Knowledge about the entrepreneurship process drawn from a community of like-minded entrepreneurs will be a key resource entrepreneurs draw on from their ecosystem

The types of resources entrepreneurs need will likely change as the firm develops and evolves. At the earliest stages before a firm is even founded, a nascent entrepreneur needs training in areas such as opportunity identification and business plan creation and may benefit from attending entrepreneurial networking events to meet other entrepreneurs at the same stage as her and to hear inspiring stories of other successful entrepreneurs to help cultivate an entrepreneurial mindset. As entrepreneurs first establish and grow their firm, they need new types of support. This includes basic business information about how to file their taxes as well as the knowledge they gain from other entrepreneurs in how to build their business, find initial customers, and how to manage their work/life balance. Early-stage entrepreneurs may also benefit from competitions that provide awards and grants both for the support it provides as well as the legitmation of winning a competition. But as firms scale up their needs will change. The knowledge they need shifts towards more intensive managerial and sales knowledge, such as how to sell to enterprise customers or how to position themselves for venture capital investment or an exit. They may draw on their social networks to find highly skilled employees or make contact with high profile international investors.

P2: The types of resources and programs an entrepreneur draws on from their ecosystem will change as the firm grows

Entrepreneurs' engagement with their ecosystem may also be influenced by the industry they are competing in. The types of knowledge, resources, and support new ventures require is dependent on the markets they are entering and technological base. Digital 'app' firms have a very low startup capital requirements and can almost immediately generate revenues through contract work while on the other hand, life science startups may require millions of dollars in investment for wet lab equipment and R&D activities and spend years before generating revenue. Because knowledge *about* the entrepreneurship process, rather than technical or market knowledge, may be one of the most crucial resources in an ecosystem, entrepreneurs in different industries may not be in a position to share entrepreneurial knowledge or take advantage of the same programs.

P3: The industry entrepreneurs are in will affect their ability to draw on resources and support from their ecosystem

Methods

Empirical studies of entrepreneurial ecosystems are still in their infancy. Quantitative approaches such as Acs et al. (2014) or Guzman and Stern (2015) have focused on linking outcomes, such as the number of high growth firms or firm survival, with inputs such as economic structures or particular support policies. Qualitative approaches such as Spigel (2015) have employed in-depth interviews with entrepreneurs to examine the processes through which ecosystems develop, evolve, and provide resources and support to entrepreneurs. Qualitative approaches are more amenable for examining the complex connections between an entrepreneur and their regional economic social and economic environment because publicly available data cannot easily examine the social relations that make up ecosystems.

A set of 8 pilot interview were conducted with technology entrepreneurs in Edinburgh, Scotland to better understand their perceptions of and engagements with the local entrepreneurial ecosystem. Edinburgh is a mid-sized city with a strong entrepreneurial ecosystem. It is home to two 'unicorn' startups valued at over 1 billion USD, several research intensive universities, and a dense network of entrepreneurs and support programs (Spigel, 2015a) Interviewees were contacted randomly from a list of participants in the Engage/Invest/Exploit (EIE) program from 2014 to 2016, an entrepreneurship support program organised by the University of Edinburgh that provides entrepreneurial training and support for entrepreneurs in technology, life science, and energy sectors that culminates in pitches at Scotland's largest investment conference. EIE participants are a useful population for this study because the programs 'curates' its participants, only working with entrepreneurs with the potential for strong growth. This allows the study to focus only on highly innovative firms while avoiding the biases associated with purposeful or snowball sampling techniques.

Results

Of the eight firms interviewed, 6 made digital products, one made a physical product, and one was a life science firm. All but one was a B2B firm that sold or planned to sell enterprise-level products to corporate clients. Firms had an average of 9.9 employees, but this ranged from a minimum of 2 to a maximum of 28. The firms were quickly growing, with an average of 39% growth in the number of employees over the past year. Five of the eight firms had received investment from either angel investors or venture capitalists. The entrepreneurs themselves were a diverse group with ages ranging from 28 to 43. Five were male and three were female. Four had a business education, two had advanced degrees in a technical or scientistic field and two others had educational backgrounds in areas unrelated to their firm, such as drama and international relations.

Through an inductive coding process, the types of resources and support entrepreneurs received from their ecosystem was identified and categorised. Nine types of resources were identified: [1] business and technical advice targeted to the firm; [2] buzz (general knowledge of changes in the local entrepreneurial community); [3] being part of a community of entrepreneurs who provide support and advice; [4] referrals to new workers; [5] knowledge about the entrepreneurship process; [6] funding from investors or support programs; [7] opportunities for entrepreneurs to extend their own social networks; [7] access to office space and in-kind support such as subsidised consulting with lawyers; [8] business training and skill development; and [9] access to university knowledge.

The most commonly used resources were business training and skill development (used by all 8 respondents), business and technical advice (7), buzz (7), a community of entrepreneurs (7), funding (6), entrepreneurial knowledge (5) and network building (5). Resources seen as crucial in the ecosystems literature, such as university research, were less used. While business training and skill development is important, its effect here is potentially over-stated due to the fact that the study population was based on the participants in the EIE training program. The business and technical advice, buzz, and entrepreneurial knowledge respondents acquired overwhelmingly came from other entrepreneurs rather than more formal sources such as training programs, incubators, or other support programs. For instance, one entrepreneur who was transitioning from a B2C to enterprise B2B spoke how he connected with another local entrepreneur who made a similar transition, saying: "I learnt a lot from his consumer approach because he started consumer and now he's gone enterprise….so when we go onto enterprise, 100% I will be picking his brains. I already have" (ER02). Another said she turned to other entrepreneurs when she was looking for investment in order to get outside opinions on their experiences with local investment groups, "…that's one of the best things about the collaboration between companies. I would definitely jus pick up the phone and be like 'How have you found them? Have they been supportive?'" (ER04).

Importantly, these types of resources were not the targeted business advice or novel technical knowledge normally considered crucial in regional innovation systems or clusters. None of the entrepreneurs reported learning about new customers from others in their ecosystem nor were they trying to gain new technical insights from other entrepreneurs that would allow for radical innovation or recombination. Indeed, most entrepreneurs said that they or their technical staff were more likely to learn about new technologies or programming language from the internet than local sources. Rather, the dominant resource entrepreneurs gathered from their ecosystem was general entrepreneurial advice from others who had been in their situation, insider knowledge about other actors in the ecosystem such as investors or prospective employees, and support from other people who have been through similar challenges. *This provides preliminary support for Proposition 1.*

Respondents were asked to select from a list of 58 entrepreneurship support programs focused on technology entrepreneurs in Scotland those that they had participated in within the past year. These programs were previously identified through an analysis of Edinburgh's institutional entrepreneurial support system (see Spigel, 2015b). On average, each participant engaged with 12.9 programs in the past 12 months (SD = 4.9), with a minimum of 7 programs and a maximum of 20. These programs ranged from multi-month, intensive training courses that involve travel to the US and China to smaller, informal networking and coffee groups for entrepreneurs. Based on H1, we would expect a negative correlation between the number of programs they engaged with and firm age. However, no significant correlation was found between firm age and number of programs. But this is not surprising given the small sample size of the pilot study.

Nevertheless, the interviews did suggest that several entrepreneurs had purposefully adjusted their participation in aspects of their ecosystem as their ventures developed and their needs changed. For example, one entrepreneur who had attended many different training and networking programs for entrepreneurs when he first founded the firm reported that he was getting "more selective of the things that I do because I think you get to a point where you've got all the basics out…and then you reach a point where you start learning less and less from each session, so I'm starting to get more picky about those" (ER03). When entrepreneurs start their firm, they appear very willing to attend broad networking and training programs that help them develop basic startup skills and meet other like minded people. However, as their ventures develop and they face more specialised challenges, their needs change and they have less time to spend at events that are unrelated to their business. An entrepreneur of a new but growing firm said that while she wanted to attend more networking events to find potential clients, "…at the moment that's tricky. I would like to go to more of these things but there are no shortage of those things, there are [too] many." (ER06).

Another entrepreneur who had already raised substantial venture capital investment and significantly scaled his firm's revenues and employees said that he had stopped attending most of the local entrepreneurial networking and training events because "I'm not going to learn anything at this point in time and it's all about learning and you've only got so much time and time is precious." (ER05). This entrepreneur said that he had set up a private 'dinner club' with other entrepreneurs at a similar stage of growth who are facing similar challenges. By limiting the attendees to other high-growth entrepreneurs in his social network he is able to create a community in which members can genuinely learn from one another's experiences in an environment that focuses on the needs of scale-

up ventures rather than smaller startups. As he describes it: “I run a thing where we have a monthly dinner for startup founders…it’s invite only so it’s not like open door. It’s only for people who have kind of got to a certain point, who have the same sort of problems, have the same sort of discussions” (ER05). The organisers are able to use the event to attract venture capitalists from London and elsewhere, enabling participants to extent their networks outside of the region.

High growth entrepreneurs found cohort-based programs to be the most useful formal source of entrepreneurial training and skill development. Cohort programs select a limited number of entrepreneurs for intensive training over a period of time. Beyond the skill development opportunities and legitmation selection into the program provides, they help create a small group of entrepreneurs at the same stage of development who can help each other long after the formal assets of the programs. Several programs in Scotland provide cohort-based learning, including the EIE program participants were drawn from, the Saltire Fellowship, and the Royal Society of Edinburgh Enterprise Fellowship. All the entrepreneurs found the cohort they developed in EIE and other programs to be very valuable for both the training and the community of entrepreneurs it helped created. One entrepreneur said of his EIE cohort a year after they finished the program: “we kept the team together so its just entrepreneurs getting together and talking” (ER03). Another said that she had recently attended an event where she was connected with a new potential customer: “a couple of former fellows there who approached me and said ‘you should do this’ and I said ‘okay send me the information’…. we wouldn’t have found out about that if I haven’t gone to events and someone else had mentioned it.” (ER07). Another entrepreneur spoke highly of EIE’s cohort building program, saying: “I’m friends with the people that we did EIE with last year and I think that’s quite supportive….I think there’s quite a strong network of folk that are on the same boat as us.” (ER06).

The importance of cohorts reflects the priority entrepreneurs placed on developing entrepreneurial knowledge and communities of other entrepreneurs as opposed to other types of resources in their ecosystem. An intensive program creates strong social bonds between participants based on their shared experiences and strengthened by them overcoming similar challenges. As entrepreneurs transition from running small startups to fast growing scale-ups, the usefulness of these programs increases as they try to cut down on their formal participation in other types of events like networking sessions and training programs. Their needs shift from having to develop their social networks and gain generalised training in areas such as business model creation and pitching to angel investors to creating strong ties with other entrepreneurs in similar situations who can help them navigate the new challenges of a quickly growing firm. *This supports Proposition 2.*

The primary product of six of the interviewed firms is some form of digital product. While the end user of these products ranged from millennial mobile clothes shoppers to major hotel chains to regions trusts of the UK’s national healthcare service, they all depended on common technologies (e.g. programming languages or cloud-based software architectures) and business models and will face similar challenges as they grow. Entrepreneurs in these markets have a large community of other experienced entrepreneurs, investors, and advisers who have encountered similar challenges in the past and who can provide advice and guidance. Two other of the interviewed entrepreneurs were outside the digital technology sector: one was developing an advanced micro-pump with applications in the aerospace and defence markets and the other was an early stage drug discovery firm. Both of these entrepreneurs felt that they there were fewer entrepreneurs they could talk with and learn from in their ecosystem. The founder of the pump company felt that his firm was “quite different [from other new ventures] because we’re not in software.” (ER01) Because his firm’s mechanical engineering expertise had little overlap with other businesses in the ecosystem, neither he nor his employees were in a position to learn new skills from other local businesses. The life science entrepreneur was similarly challenged by the lack of other entrepreneurs in his sector. In his view: “The ecosystem is something that doesn’t exist [for me]….as far as peers in the sense of companies that do similar things.” (ER08). Despite the small size of Scotland’s life science startup community, he had been able to use one of the cohort-based programs to create a community with two other founders of life science firms, “we’re a cohort of three…we can really easily talk to each other at a technical level and at a business level, which has been really useful.” (ER08).

Both these entrepreneurs felt there were fewer resources they could gather from their ecosystem as a result of their industry. First, because of their different technological foundations, there was less they could learn about new developments in the market place and new innovations from their discussions with other entrepreneurs. As the founder of the pump firm said: “With mechanical engineering, it’s a bit different” (ER01). Beyond this, both found difficulty working with local investors who are more used to digital startups. This was particularly true for the life science entrepreneur, who has stymied by the lack of investors with deep experience in the drug discovery market and who were willing to invest for the long periods required to identify and develop novel treatments.

However, it is important to note there was no observed trend with entrepreneurs outside the digital product industry participating in fewer support programs. While the founder of the mechanical engineering firm only participated in 7 programs, —the lowest rate in the sample — the life science entrepreneur participated in 20, matching the maximum. The former’s lower participation rate may be function of his location at the periphery of

Edinburgh or due to the fact that he had young children rather than as a result of his industry. *Thus, there is only mixed evidence to support Proposition Three.*

Discussion and Implications

The initial findings from this pilot study suggest three important topics for further research into entrepreneurial ecosystems. First, knowledge about the entrepreneurship process provided by other entrepreneurs is a crucial resource of entrepreneurial ecosystems. This study identified nine different types of resources ranging from well known ones such as financing to less recognised resources such as buzz from a community of entrepreneurs. Resources that have been previously identified as critical parts of entrepreneurial ecosystems, such as knowledge spillovers from nearby research universities, were seen as less important than other resources such as learning about the entrepreneurship process from other entrepreneurs. Entrepreneurs clearly gained crucial knowledge about how to expand their ventures and prepare for upcoming challenges by talking with other, more experienced entrepreneurs the ecosystem rather than through training or educational programs. By expanding their social networks through both formal networking programs as well as their own informal social interactions with other entrepreneurs, they were able to identify potential employees, learn about the reputations of investors, and otherwise glean useful knowledge from their entrepreneurial community.

Second, how entrepreneurs engaged with the ecosystem appears to shift as their firms grow. Entrepreneurs of quickly growing firms tended to cut back on their participation in formal entrepreneurship support and networking programs both due to their lack of time as well as the feeling that they had little to learn from programs focused on startups rather than scale-ups. Several respondents reported having built their own informal groups of entrepreneurs at similar stages of growth in order to share experiences, learn from one another, and build their networks with outside investors. A shift from looking for new entrepreneurs looking for general business knowledge and networking opportunities from the ecosystem to the more specific needs of quickly growing entrepreneur was observed.

Finally, there was some evidence of a heterogeneous ecosystem in which entrepreneurs in sectors outside of the dominant software product paradigm were not able to integrate well into. Founders of engineering and life science firms both said that they were not able to benefit from the flow of entrepreneurial knowledge through the ecosystem because of the specifics of their own industries. The different paths to market, growth strategies, and lifecycles of their specific sector mean that there is less they can learn from those outside of it. However, this does not imply that these entrepreneurs were necessarily less engaged with their ecosystem. The life science entrepreneur was able to participate in a cohort-based support program that linked him with two other life science entrepreneurs who were able to share insights and advice.

These findings suggest we need a more nuanced understanding of how entrepreneurs benefit from being located in a dense entrepreneurial ecosystem. Existing research has focused on identifying the key attributes or factors associated with strong ecosystems. However, this research suggests that even within a strong ecosystem, there are many ways in which entrepreneurs gather resources and interact with one another. This is a dynamic process, changing both over time and in response to the entrepreneurs' sector, stage in the entrepreneurship process, and personal circumstances. More research is needed to better understand the ways in which entrepreneurs engage with their ecosystem and how this might affect their subsequent growth.

This research is the first steps in understanding the micro-foundations of entrepreneurial ecosystems. This is a ground-up view of entrepreneurial ecosystems that focuses on the types of resources that entrepreneurs gain from being located in a strong (or weak) entrepreneurial ecosystem and the practices and strategies entrepreneurs employ to gather them. In conjunction with more macro-level analyses of the inputs and outputs of strong entrepreneurial ecosystem, this research will equip policymakers and entrepreneurs with the understanding of how ecosystems work in order to build more effective programs and communities to support the types of high-growth entrepreneurship that is now seen as a cornerstone of sustainable economic development.

The findings here are limited by the small sample size. Further research will expanded the number of interviews conducted in order to create a more robust and generalisable basis to understand how entrepreneurs draw on resources from their ecosystem. It is important to increase the number of interviewed entrepreneurs outside of the digital product sector. Beyond this, it is also important to speak with growth-oriented entrepreneurs who have not participated in EIE or similar programs in order to better understand their perspectives on the ecosystem to avoid the implicit biases that common participation in the same program might create. Finally, it is important to implement a similar research protocol in other ecosystems in order to understand how much of the findings are unique to Edinburgh's ecosystem and what are more generally true of all high-tech entrepreneurial ecosystems in developed economies.

Contact

Ben Spigel; ben.spigel@ed.ac.uk; (T); 29 Buccleuch Place, Edinburgh, EH8 9JS UK

Bibliography

Acs, Z. J., Autio, E., & Szerb, L. (2014). National Systems of Entrepreneurship: Measurement issues and policy implications. *Research Policy, 43*, 476-494. doi:10.1016/j.respol.2013.08.016

Aldrich, H. E., & Yang, T. (2014). How do entrepreneurs know what to do? learning and organizing in new ventures. *Journal of Evolutionary Economics, 24*(1), 59-82. doi:10.1007/s00191-013-0320-x

Anderson, A. R., Dodd, S. D., & Jack, S. (2010). Network practices and entrepreneurial growth. *Scandinavian Journal of Management, 26*, 121-133. doi:10.1016/j.scaman.2010.01.005

Audretsch, D. B., & Belitski, M. (2016). Entrepreneurial ecosystems in cities: establishing the framework conditions. *The Journal of Technology Transfer*. doi:10.1007/s10961-016-9473-8

Auerswald, P. (2015). Enabling Entrepreneurial Ecosystems. In D. Audretsch, A. Link, & M. L. Walsok (Eds.), *The Oxford Handbook of Local Competitiveness* (pp. 54-83). Oxford: Oxford University Press.

Autio, E., Kenney, M., Mustar, P., Siegel, D., & Wright, M. (2014). Entrepreneurial innovation: The importance of context. *Research Policy, 43*(7), 1097-1108. doi:10.1016/j.respol.2014.01.015

de Clercq, D., & Voronov, M. (2009). Towards a Practice Perspective of Entrepreneurship: Entrepreneurial Legitimacy as Habitus. *International Small Business Journal, 27*, 395-419.

Dubini, P. (1989). The influence of motivations and environment on business start-ups: Some hints for public policies. *Journal of Business Venturing, 4*, 11-26. doi:10.1016/0883-9026(89)90031-1

Feld, B. (2012). Startup Communities: Building an Entrepreneurial Ecosystem in your City. Hoboken, NJ: Wiley.

Guzman, J., & Stern, S. (2015). Innovation economics. Where is Silicon Valley? *Science, 347*(6222), 606-609. doi:10.1126/science.aaa0201

Henry, N., & Pinch, S. (2000). Spatialising knowledge: placing the knowledge community of Motor Sport Valley. *Geoforum, 31*, 191-208.

Isenberg, D. J. (2010). The Big Idea: How to Start an Entrepreneurial Revolution. *Harvard Business Review, 88*, 40-50.

Mack, E., & Mayer, H. (2015). The evolutionary dynamics of entrepreneurial ecosystems. *Urban Studies*. doi:10.1177/0042098015586547

Malecki, E. J. (1997). Entrepreneurs, networks, and economic development: a review of recent research. In J. A. Katz (Ed.), *Advances in Entrepreneurship, Firm Emergence, and Growth* (Vol. 3, pp. 57-118). Greenwich, CT: JAI Press.

Mason, C., & Brown, R. (2013). Creating good public policy to support high-growth firms. *Small Business Economics, 40*, 211-225. doi:10.1007/s11187-011-9369-9

Mason, C. M., & Brown, R. (2014). Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship. Retrieved from The Hague:

Moore, J. F. (1993). Predators and Prey: A New Ecology of Competition. *Harvard Business Review, May-June*, 75-86.

Motoyama, Y., Konczal, J., Bell-Masterson, J., & Morelix, A. (2014). Think Locally, Act Locally: Building a robust entrepreneirial ecosystem. Retrieved from

Neck, H. M., Meyer, G. D., Cohen, B., & Corbett, A. C. (2004). An Entrepreneurial System View of New Venture Creation. *Journal of Small Business Management, 42*, 190–208. doi:10.1111/j.1540-627X.2004.00105.x

Peer, H. K. (1994). Spectator communities and entrepreneurial districts. *Entrepreneurship & Regional Development, 6*, 177-198. doi:10.1080/08985629400000011

Spigel, B. (2015a). *Developing and Governing Entrepreneurial Ecosystems: Evidence from Edinburgh*. Paper presented at the 8th International Conference for Entrepreneurship, Innovation and Regional Development, Sheffield.
Spigel, B. (2015b). The Relational Organization of Entrepreneurial Ecosystems. *Entrepreneurship Theory and Practice*. doi:10.1111/etap.12167
Spilling, O. R. (1996). The entrepreneurial system: On entrepreneurship in the context of a mega-event. *Journal of Business Research, 36*, 91-103. doi:10.1016/0148-2963(95)00166-2
Stam, E. (2015). Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique. *European Planning Studies*, 1-11. doi:10.1080/09654313.2015.1061484
Startup Genome Project. (2012). *Startup Ecosystem Report 2012*. Retrieved from
Van de Ven, A. (1993). The Development of an Infrastructure for Entrepreneurship. *Journal of Business Venturing, 8*, 211-230.
World Economic Forum. (2013). Entrepreneurial Ecosystems Around the Globe and Company Growth Dynamics. Retrieved from
Zacharakis, A. L., Shepherd, D. A., & Coombs, J. E. (2003). The development of venture-capital-backed internet companies: An ecosystem perspective. *Journal of Business Venturing, 18*, 217-231. doi:10.1016/S0883-9026(02)00084-8